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## New NIST RMs/SRMs

### ***NIST RM 8640 Microspheres with Immobilized Fluorescein Isothiocyanate***

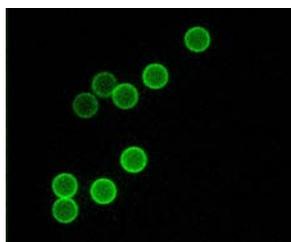
RM 8640 is a set of six vials containing microsphere suspensions, each with a different amount of fluorescein immobilized on the surface of its microspheres. The set of microsphere suspensions is used to calibrate flow cytometry instruments that measure fluorescence intensity. Intended for manufacturers of secondary standards, each reference material kit costs approximately \$3000. The material was developed in collaboration with scientists at the Centers for Disease Control and



Prevention (CDC) and the U.S. Food and Drug Administration (FDA).

The intensity of fluorescent markers is used to track antibodies, cancer cells, specific genes or other biomolecules. For example, the brightness of a signal from a sample can be used to determine whether a disease has progressed or is in remission. In the past, the fluorescence signal's intensity could be assessed only by visual interpretation or with benchmarks contributed by individual manufacturers. With these methods, measurement of the same signal could vary by more than 100 percent depending on the instrument used and a variety of experimental conditions.

RM 8640 represents only the beginning of the process of quantifying fluorescence intensity on a national scale. The achievement of quantitation will benefit research in hematological diseases, particularly leukemias and lymphomas. The use of flow cytometry measurements, which has been greatly expanded with the HIV/AIDS epidemic, is being used in tumor vaccine development and to evaluate graft products for peripheral blood stem cell transplantation.



Microspheres, each bearing a glowing fluorophore, are used to calibrate flow cytometry instruments that measure fluorescence intensity.

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## ***NIST SRM 2921 Human Cardiac Troponin***

### **More than one million Americans will suffer a myocardial infarction or heart attack this year.**

Symptoms associated with heart attacks may result from other health conditions. Therefore, it is critical that heart attacks be diagnosed quickly and accurately to permit rapid treatment. When an individual is admitted to a hospital with heart attack-like symptoms, it is very likely that the blood sample drawn will be subjected to analysis for a heart muscle protein, troponin-I. The presence of this protein in the blood is strong evidence that damage to heart tissue has occurred, and the level of this protein is indicative of the severity of the damage.

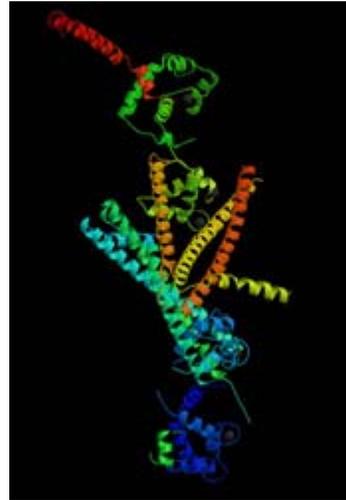
Unfortunately, different assays used to measure troponin-I may give significantly different results, leading to erroneous diagnoses. NIST, in conjunction with the American Association for Clinical Chemistry (AACC) has conducted research to reduce these differences.

Round-robin studies organized by NIST and AACC demonstrated that a common calibrator used among the different assays greatly reduces the intermethod variability. Based on these studies, a troponin-I material in the form of a complex with other troponin proteins extracted from human heart tissue was identified as the best material for this calibration. NIST acquired some of this material, dissolved it in a buffer solution, and measured the troponin-I concentration. This material, SRM 2921 Cardiac Troponin Complex, is now available to the *in-vitro* diagnostic industry and its

customers, the hospitals and clinical laboratories, to improve the accuracy of troponin-I measurements and thus, improve diagnosis of heart attacks.

SRM 2921 is the first human protein standard provided by NIST. The knowledge gained from this process will lead to more SRMs for important diagnostic proteins.

A unit of SRM 2921 consists of five vials, each containing approximately 115  $\mu\text{L}$  of a dilute solution of human cardiac troponin complex.



*Computer model of the complex crystal structure of the human protein cardiac troponin.*

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## **New Ethanol-Water Standard Reference Materials to Support Blood- and Breath-Alcohol Testing; NIST SRMs 1847, 1828b and SRMs 2891 through 2899**

Accurate calibration of instrumentation is critical in areas of forensic testing where quantitative analysis directly affects criminal prosecutions, as is the case with the determination of ethanol in blood and breath. Blood- and breath-alcohol testing can be imposed on individuals operating private vehicles such as cars, boats, or snowmobiles, and operators of commercial vehicles like trucks, planes, and ships. The various levels of blood-alcohol that determine whether these operators are considered legally impaired vary depending on the circumstances, state, and even month in which the testing is occurring. By providing SRMs with concentration levels set to legally relevant points, the accuracy of blood- and breath-alcohol testing will be improved. Two new ethanol in water standards, SRM 1828b and SRM 1847 with six and three concentrations, respectively, have been issued to replace the current SRM 1828a, which had four concentrations.

The concentration levels in SRM 1828b Ethanol-Water Solutions (Blood-Alcohol Testing: Six Levels) have been tailored to legally relevant points, specifically 0.02 % and 0.04 % for "zero tolerance" and occupational alcohol testing, 0.08 % and 0.1 % for state drunk driving laws, and 0.2 % and 0.3 % for an average and high level for blood alcohol measurements. These six levels are

individual solutions in SRMs 2891 through 2896, respectively.

In addition, three concentration levels of ethanol in water (2 %, 6 %, and 25 %) have been prepared as SRM 1847 Ethanol-Water Solutions (Breath-Alcohol Testing: Three Levels) for use as reference solutions for breath-alcohol instruments. These three levels are also available as individual solutions in SRMs 2897 through 2899, respectively.

The Ethanol-Water SRMs were prepared gravimetrically, and the concentrations of ethanol in water were confirmed at NIST by using gas chromatography with flame ionization detection.

The National Metrology Laboratory (CSIR-NML) in Pretoria, South Africa provided measurements for each of the nine concentrations of ethanol in water using a titrimetric method shown to be very precise and accurate. The National Analytical Reference Laboratory (NARL) in Sydney, Australia (another national metrology laboratory) provided measurements for four of the solutions (0.08 %, 0.1 %, 0.2 %, and 6 %) using an exact matching isotope dilution-gas chromatography, also a method demonstrated to be very precise and accurate. The certified concentrations of ethanol in water of the SRMs are based on a combination of the gravimetry, NIST, CSIR-NML, and NARL measurements. The relative expanded uncertainties for the certified concentrations are less than 1.2 % for each concentration level.

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***NIST RM 8559 Coal-Related Natural Gas: Compound-Specific Carbon-13 Isotopic Standard******NIST RM 8560 Oil-Related Natural Gas: Compound-Specific Carbon-13 Isotopic Standard******NIST RM 8561 Biogenic Natural Gas: Compound-Specific Carbon-13 Isotopic Standard***

As the cost of foreign oil rises, the discovery of new U.S. fuel sources becomes an economic necessity. Among the many methods of oil exploration in current use, chemical and isotopic measurements of trace levels of gas emanating from sediment are a recognized but underdeveloped means to locate and appraise hidden petroleum and fuel gas reserves.

The ratio between the two stable isotopes of carbon,  $^{12}\text{C}$  and  $^{13}\text{C}$ , is systematically variable in natural systems. There is a preference for the lighter isotope in biological processes, so highly bioprocessed materials, such as hydrocarbon gases associated with a petroleum reserve, are measurably depleted in  $^{13}\text{C}$ . In fact, each individual compound will have a distinctive isotopic composition based upon its particular origin and formation history. Compound-specific isotopic measurements can thereby provide insights to the nature and capacity of the reserve.

While chemical measurements of natural gas are generally routine, the reliability of compound-specific isotopic measurements has been questionable. An attempt to address this issue was carried out in the early 1980s by several international organizations, including the Chevron Oil Company, Azienda Generale Italiana Petroli, and the International Atomic Energy Agency. This collaboration led to the collection of the so-called Natural Gas Standards (NGS), which were samples from three isotopically distinct sources of natural gas. While the availability of the NGS materials was a significant advance, the



difficulty in chemical separations and isotopic analysis, as well as differences in data evaluation methods, led to wide dispersion in intercomparison results that prevented the assignment of precise isotopic values. This shortcoming limited the usefulness of these materials and created the need to characterize these materials with greater attention to method design and isotope metrology.

Eleven NIST isotope reference values (and four NIST informational values) for carbonaceous compounds in the three materials are based on measurements using different methods performed by laboratories in collaboration with NIST. The collaborators, Isotech Laboratories in Champaign, IL, and Exxon-Mobil Upstream Research Corporation in Houston, TX, provided the measurement data, which were transmitted, to NIST for evaluation and conversion to standardized results. Emphasis was placed on assuring that all measurements were traceable to the internationally accepted carbon isotope ratio scale. For traceability, NIST RM 8563  $\text{CO}_2$ -Light, Petrochemical Origin, a carbon dioxide isotopic reference material derived from petroleum that has a carbon-13 composition similar to the hydrocarbons in the NGS materials, was utilized.

*Continued on page 5....*

***NIST RM 8559 Coal-Related Natural Gas: Compound-Specific Carbon-13 Isotopic Standard******NIST RM 8560 Oil-Related Natural Gas: Compound-Specific Carbon-13 Isotopic Standard******NIST RM 8561 Biogenic Natural Gas: Compound-Specific Carbon-13 Isotopic Standard***

*continued...*

Also, a standard computational method for converting the isotopic measurements of carbon dioxide into standardized carbon-13 results was used. This computational method is now accessible as a NIST web-based tool <http://www.nist.gov/widps-co2>.

RMs 8559 to 8561 are supplied as compressed natural gas (about 2 grams) in 50 mL stainless steel cylinders, and are intended for use in instrument calibrations and for quality assurance in gas chromatography-isotope ratio mass spectrometry (GC-IRMS). GC-IRMS is a recently commercialized technique that combines the chemical specificity of gas chromatography with the isotopic specificity and sensitivity of isotope ratio mass spectrometry.

Besides helping petroleum exploration, these RMs may be used to improve the quality of GC-IRMS measurements of atmospheric methane, a greenhouse gas linked to climate change. Isotopic measurements, taken at strategic locations throughout a region, are used to help identify and apportion the individual sources of methane.

Use of these RMs will improve the consistency and reliability of measurement data, thereby enabling researchers to compare measurements among laboratories and over time to form a coherent, metrologically sound picture of climate change.

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## NIST and the Silica Fume Association Announce the Availability of Standard Reference Material® 2696 Silica Fume

The National Institute of Standards and Technology (NIST) in cooperation with the Silica Fume Association (SFA) is pleased to announce the release of a new Standard Reference Material, SRM® 2696 Silica Fume. SRM 2696 is primarily intended for use in evaluating chemical and instrumental methods of analysis of silica fume used in conjunction with product specifications. Certified values are now established for silicon expressed as SiO<sub>2</sub> and six other chemical constituents, plus reference values for five chemical constituents and a physical measurement parameter, *specific surface area*, determined using nitrogen absorption. All values are products of extensive testing by NIST and collaborating laboratories from manufacturers, distributors, state departments of transportation, universities, and commercial testing laboratories.

SRM 2696 is the culmination of a five-year development project carried out by the SFA and NIST, and financed in part by the Federal Highway Administration. The Silica Fume Standard Reference Material was developed in response to the increased usage of silica fume as an ingredient of high performance concrete (HPC). Silica fume is a byproduct of producing silicon metal and ferrosilicon alloys, and its chemical and physical properties make it a very reactive pozzolan. Concrete containing silica fume can have very high strength and durability. More and more, silica fume is being recycled in this manner instead of being placed in landfills. Standard-writing organizations around the world are implementing specifications for chemical composition and physical properties of silica

fume, which has created a need for a suitable certified reference material.

Each unit of SRM 2696 consists of a single sealed bottle of approximately 70 grams of powder supplied with a Certificate of Analysis and a Material Safety Data Sheet (MSDS).

SRM 2696 can be ordered directly from NIST through the secure, online SRM Order Request System: <https://srmors.nist.gov>

Copies of the certificate and MSDS are also available (no purchase required) from the SRM website, by telephone (301) 975-6776, fax (301) 926-4751, or email [srminfo@nist.gov](mailto:srminfo@nist.gov).



High-strength, silica fume concrete was used to stiffen the Key Bank Tower in Cleveland, Ohio.

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# Renewals

**SRM 965a** Glucose in Frozen Human Serum

**SRM 3192** Aqueous Electrolytic Conductivity

**SRM 1643e** Trace Elements in Water

**SRM 3199** Electrolytic Conductivity

**SRM 1828b** Ethanol-Water Solutions (Blood-Alcohol Testing: Six Levels)

**SRM 1483a** Linear Polyethylene

**SRM 3191** Aqueous Electrolytic Conductivity

**SRM 3198** Aqueous Electrolytic Conductivity

**SRM 3196** Aqueous Electrolytic Conductivity

**RM 8441a** Wheat Hardness

# Revisions

## *Certificate Revisions—Are you Using These Materials?*

This is a list of our most recent certificate revisions. Users of NIST SRMs should ensure that they have the most recent certificates. NIST updates certificates for a variety of reasons, such as the extension of the expiration date or to include additional information gained from stability testing. If you do not have the most recent certificate for your material, you can print or view a copy from the website at: <http://www.nist.gov/srm>, or contact SRM at: Phone: (301) 975-6776

Fax: (301) 926-4751  
Email: [srminfo@nist.gov](mailto:srminfo@nist.gov).

**SRM 1646a Estuarine Sediment**  
Editorial Changes

**SRM 3150 Silicon Standard Solution**  
**Lot # 991108**  
New Expiration Date:  
01 May 2008

**SRM 3190 Aqueous Electrolytic Conductivity**  
**Lot # 030904**  
Change in the certified value

**SRM 1667b Propane in Air, 50  $\mu\text{mol/mol}$**   
New Expiration Date:  
01 December 2009

**SRM 1640 Trace Elements in Water**  
New Expiration Date:  
01 June 2006

**SRM 133b Chromium-Molybdenum Steel**  
New Expiration Date:  
01 August 2024

## REVISIONS CONTINUED...

### **NOTICE: SRM 1258 Aluminum Alloy 6011 is replaced by SRM 1258-I**

Purchasers of SRM 1258 Aluminum Alloy 6011 are notified that the certificate for SRM 1258 dated 04 June 2004, replaces the original certificate for this SRM. NIST is also offering to replace SRM 1258 units at no charge.

The revised certificate for SRM 1258 reflects the decertification of the magnesium value due to material variability. The new certificate contains the following changes:

- the magnesium value has been changed from a certified value to an information value;
- chromium and nickel values have been changed from certified values to reference values to conform to current NIST certification requirements (reference 2 on the revised certificate);
- uncertainties for all certified values have been updated to conform to the ISO and NIST Guides (reference 3 on the revised certificate).

Because of the change in status of magnesium for SRM 1258, NIST is offering to provide a free replacement SRM 1258-I to any customer who requests such replacement. This offer is extended for a period of one year (until 31 July 2005) to all SRM 1258 customers of record. The certificate for SRM 1258-I reflects the following updates:

- the magnesium value is certified at 1.00 %  $\pm$  0.03 % ;
- the value for titanium is upgraded from an information value to a certified value;
- chromium and nickel values are reference values to conform to current NIST certification requirements (reference 2 on the certificate);
- uncertainties of all certified values in SRM 1258-I conform to the ISO and NIST Guides (reference 3 on the certificate).

The revised certificate for SRM 1258 and the certificate for SRM 1258-I are available from the NIST SRM Program website, <http://www.nist.gov/srm>. If

you or one of your predecessors purchased SRM 1258, please contact the NIST SRM Program via email; [srminfo@nist.gov](mailto:srminfo@nist.gov), fax 301-948-3730, or phone 301-975-6776 to receive a replacement unit of SRM 1258-I. For assistance with technical questions or concerns, please contact Dr. John Sieber of the NIST Analytical Chemistry Division via email; [john.sieber@nist.gov](mailto:john.sieber@nist.gov) or phone; 301 975 3920.

### **SRM 1258 Aluminum Alloy 6011 (SRM 1258) may be exchanged for SRM 1258-I at no charge)**

SRM 1258 has been revised to reflect the decertification of Mg, Cr, Ni, and Be. Mg and Be have been reduced to information values. Cr and Ni have been reduced to reference values.

**REVISIONS CONTINUED...****Notice to Users of SRM 600 Bauxite (Australian): Out-of-date certificate shipped with some units.**

Please be advised that some units of SRM 600 Bauxite (Australian) purchased prior to June 21, 2004 were inadvertently shipped with an out-of-date certificate. This certificate, dated December 27, 1988, contains a sulfur value of 0.19 %  $\pm$  0.05 %, which was corrected in 1991.

NIST is unable to determine which customers may have received the 1988 certificate. NIST requests that all purchasers of SRM 600 verify that they are using the current SRM 600 certificate, dated January 2, 1991, which contains the current certified sulfur value of 0.155 %  $\pm$  0.006 %. Your help in getting this information to the appropriate persons is sincerely appreciated.

The current certificate for SRM 600 is available from the NIST SRM Program website: [www.nist.gov/srm](http://www.nist.gov/srm) and can be viewed and printed at: [http://patapsco.nist.gov/srm/catalog/common/view\\_cert.cfm?srm=3198](http://patapsco.nist.gov/srm/catalog/common/view_cert.cfm?srm=3198).

The NIST Standard Reference Materials Program deeply regrets any problems or confusion your organization may have incurred as a result of receiving the out-of-date certificate. For further assistance please contact Bruce MacDonald of the NIST Measurement Services Division at: [bruce.macdonald@nist.gov](mailto:bruce.macdonald@nist.gov) or (301) 975 2017.

**SRM 2644a Propane in Nitrogen, 250  $\mu$ mol/mol**

New Expiration Date:  
01 December 2009

**SRM 3195 Aqueous Electrolytic SRM Conductivity**

**Lot#011804**  
Uncertainty updated;  
New Expiration Date:  
24 May 2005

**SRM 3134 Molybdenum Standard Solution Lot # 891307**

Editorial Changes;  
New Expiration Date:  
01 December 2006

**SRM 3155 Tantalum Standard Solution**

**Lot # 993108**  
Editorial Changes; New Expiration Date:  
13 July 2008

**SRM 919a Sodium Chloride** Editorial Changes**C1253a Phosphorus Deoxidized Copper – Cu X** Editorial Changes**SRM 16f Basic Open-Hearth Steel 1 % Carbon** Manganese uncertainty updated**SRM 1632c Trace Elements in Coal** Addition of an F reference value**SRM 1623c Sulfur in Residual Fuel Oil** New Expiration Date:  
13 June 2012**RM 8010 Sand for Sieve Analysis** Correction in mass sample provided in the unit size**SRM 1001 X-Ray Film Step Tablet** Extension of the certification period

# ***NIST SRM News***

## ***Now Order NIST SRMs Online***

You can now order NIST SRMs through our new online ordering system. This system is efficient, user-friendly and secure. Our improved search picks up keywords on the detail page along with the words in the title of each SRM.

In addition, we are in the midst of a project to add numerous certificate references for each SRM online. Please also note we are also adding numerous archived certificates online for your convenience.

<https://srmors.nist.gov>

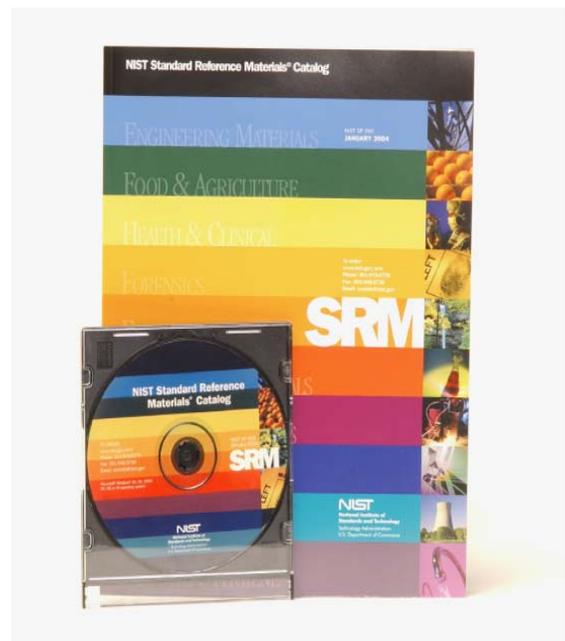
## **SRM MARKETING CATALOG NOW ON CD**

If you would like a copy of our March 2004 SRM Marketing Catalog on CD please call, fax, or email us at:

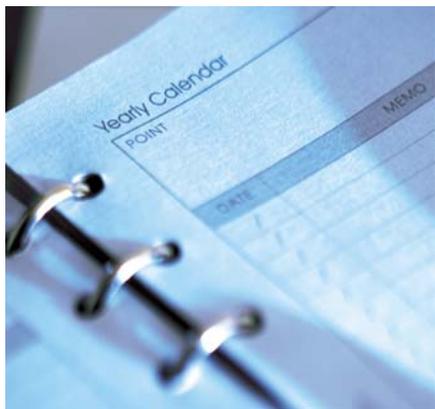
Ph: 301-975-6776

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# NIST SRM Exhibit Schedule

**Association of Official Analytical Chemists (AOAC)**

*September 19-23, 2004*

St. Louis Convention Center

St. Louis, MO

**Eastern Analytical Symposium (EAS)**

*November 11-14, 2004*

Somerset Convention Center

Somerset, NJ